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Qualification tests were performed to determine whether the in-service Mk 46 Mod 2 Battery Shipping and Storage Container could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 143.5 kg (316.5 pounds). The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods and the Department of Transportation's Title 49 CFR and the Final Rulings published in the Federal Register, Vol. 55 on 21 Dec 90. The container has conformed to the POP performance requirements; i.e., the container successfully retained its contents throughout the specified tests.

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POP Test of Mk 46 Mod 2 Battery Shipping and Storage Container

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PERFORMANCE ORIENTED PACKAGING TESTING OF CONTAINER, SHIPPING AND STORAGE, BATTERY, MK 46 MOD 2

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13 June 1991

FINAL

DISTRIBUTION UNLIMITED

Sponsoring Organization:
Naval Mine Warfare Engineering Activity
Yorktown, VA 23691-5076

INTRODUCTION

The Mk 46 Mod 2 Battery Shipping and Storage Container tested, contained a simulated load of 316.5 pounds of sand representing the worst case of loading. Overall weight of the container was 377.5 pounds. This Performance Oriented Packaging (POP) test was performed to ascertain whether this standard container (Packing Group II) would meet the requirements as specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A base level vibration test was also conducted in accordance with the final rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register Volume 55.

The objectives of these tests were to minimize the risk of personnel or environmental exposure to the hazards associated with the contents in the advent of a transportation or handling accident.

TESTS PERFORMED

1. Base Level Vibration Test

This test was performed in accordance with paragraph 178.608 of the Performance Oriented Packaging Standards, Final Ruling, published in the Federal Register, Vol. 55, No. 246, December 21, 1990. Three sample containers were placed on the repetitive shock platform. The containers were restrained during vibration in all but the vertical direction. The frequency of the platform was increased until the container left the platform 1/16 of an inch at some instant during each cycle. Test time was 1 hour at a frequency of 3.75 Hz.

2. Stacking Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.6. Three containers were used for this test. Each container was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a height of 3 meters (including the test sample). A weight of 1,100 pounds was stacked on each sample container. The test was performed for 24 hours. After the allowed time, the weight was removed and the containers examined.

3. Drop Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.3. Six containers were used as required. The drops were performed from a height of 1.2 meters (4 feet) in the following orientations (three containers for each orientation):

a. Horizontally.

b. Diagonally on the edge between the cover assembly and the top ring of the container.

This test was performed at an ambient temperature of $+70 \pm 20$ °F.

PASS/FAIL (UN CRITERIA)

1. Base Level Vibration Test (HM-181 CRITERIA)

The criteria for passing the base level vibration test is outlined in paragraph 178.608 of the Title 49 CFR Final Ruling and states the following: "immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. Rupture or leakage from any of the packages constitutes failure of the test."

2. Stacking Test (UN CRITERIA)

The criteria for passing the drop test is outlined in paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "... no test sample should leak. No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages."

3. Drop Test (UN CRITERIA)

The criteria for passing the drop test is outlined in paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle; e.g., a plastic bag, even if the closure is no longer sift-proof. A slight discharge from the closure(s) upon impact should not be considered to be a failure of the packaging provided that no further leakage occurs."

TEST RESULTS

1. Base Level Vibration Test

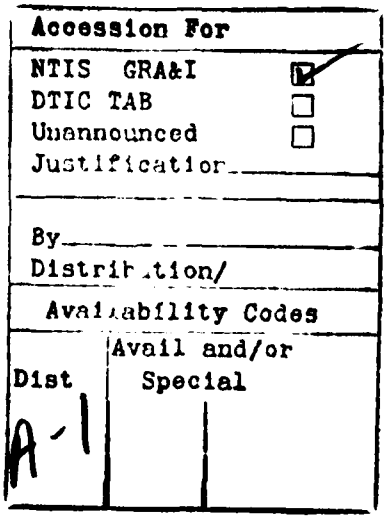
Satisfactory.

2. Stacking Test

Satisfactory.

3. Drop Test

Satisfactory.



DISCUSSION

1. Base Level Vibration Test

Immediately after the vibration test was completed, each container was removed from the platform, turned on its side and observed for any evidence of leakage. There was no leakage to the containers as a result of this test.

2. Stacking Test

Each container was visibly checked after the 24-hour period was over. There was no leakage, distortion, or deterioration to any of the containers as a result of this test.

3. Drop Test

After each drop, the containers were inspected for any damage which would be a cause for rejection. The inspection after the horizontal drops indicated that the deformation was noticeable around the point of impact, but no leakage was found. Deformations for diagonal drops were more severe. (See figure 1.) Conditions which would indicate leakage of the actual contents were not observed. The containers remained intact and functional upon completion of the tests.

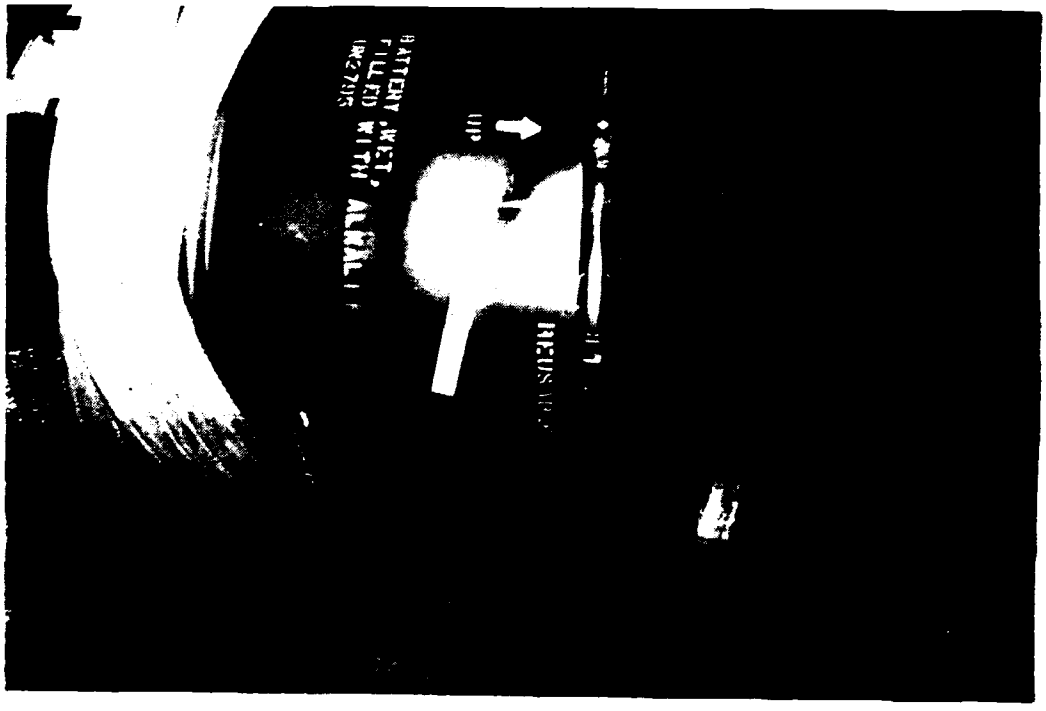


FIGURE 1
After Diagonal Drop Test

REFERENCE MATERIAL

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6

B. Title 49 CFR 107, et al., Performance Oriented Packaging Standard; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative; Final Rule, Federal Register, Vol. 55, No. 246 of December 21, 1990.

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TEST DATA SHEET

DATA SHEET:	
Container: Mk 46 Mod 2 Battery Shipping and Storage Container	
Type: 1B2	**Container P/N or NSN:** N/A
Specification Number: 5167267	**Material:** Aluminum
Gross Weight: 171 kg (377.5 pounds)	**Dimensions:** 37.5" H x 24" D
Closure (Method/Type): Removable Cover	**Tare Weight:** 27.7 kg (61 pounds)
Additional Description: See NAVSEA SW023-AB-WHS-010 for packaging info	
PRODUCT: See table	
Name: See table	**NSN(s):** See table
United Nations Number: See table	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A **At 50 °C:** N/A **At 55 °C:** N/A	
Consistency/Viscosity: N/A	**Density/Specific Gravity:** N/A
Amount Per Container: 1	**Flash Point:** N/A
Net Weight: See table	
TEST PRODUCT:	
Name: Simulated weight of sand	**Physical State:** Solid
Consistency: N/A	
Density/Specific Gravity: N/A	
Test Pressure (Liquids Only): N/A	
Amount Per Container: N/A	**Net Weight:** 143.5 kg (316.5 pounds)

TABLE 1
Mk 46 Mod 2 Battery Shipping and Storage Container

NALC	NSN	Type	Packing Drawing	UN Code	UN Number	#/ Cntr	Weight (lb)
GW45	6135-01-108-2864	Mk 46 Mod 2 Battery Water Activated	5167267	N/A	N/A	1	285

MK 46 MOD 2 BATTERY SHIPPING AND STORAGE CONTAINER

POP MARKING

UN 1B2/Y171/S/**/USA/DOD/NAD

** YEAR LAST PACKED OR MANUFACTURED

Encl (2)